

What is Claimed is:

1. An apparatus for removing mercury from a gas stream, the apparatus
comprising:

a polyethersulfone surface or a surface coated with an anion exchange resin;

5 and,

elemental iodine disposed thereon.

2. An apparatus according to claim 1 wherein the elemental iodine disposed on
the polyethersulfone or resin-coated surface is chemisorbed thereon.

10

3. An apparatus according to claim 2 wherein the polyethersulfone or resin-
coated surface is selected from the group consisting of external surfaces and interstitial
surfaces.

15 4. An apparatus according to claim 1 wherein the elemental iodine is deposited
on the polyethersulfone or resin-coated surface by applying a solution of an organic fluid
and elemental iodine to the polyethersulfone surface.

5. An apparatus according to claim 1 wherein the temperature of the gas stream
20 is up to about 300° F.

6. An apparatus according to claim 1 wherein the polyethersulfone or resin-coated surface is a surface of a substrate wherein the substrate is selected from the group consisting of woven material, a fibrous mat, a porous solid, a non-porous solid, and a finely divided solid.

5

7. An apparatus according to claim 6 wherein the substrate is a porous solid defining passageways through the solid, and wherein the passageways include at least one polyethersulfone or resin-coated surface.

10 8. An apparatus according to claim 1 which further comprises:
a chamber including a substrate support, a gas inlet and a gas outlet; and,
the polyethersulfone or resin-coated surface with the iodine disposed thereon
disposed within the chamber.

15 9. An apparatus according to claim 4 wherein the solution of pentane and
elemental iodine comprises elemental iodine dissolved in pentane at a ratio of at least
0.001 moles per liter.

20 10. An apparatus according to claim 4 wherein the solution of pentane and
elemental iodine comprises elemental iodine dissolved in pentane at a ratio of at least 0.01
moles per liter.

11. An apparatus according to claim 4 wherein the solution of pentane and elemental iodine comprises elemental iodine dissolved in pentane at a ratio of between 0.01 and 0.10 moles per liter.

5 12. An apparatus according to claim 4 wherein the solution of pentane and elemental iodine comprises elemental iodine dissolved in pentane at a ratio of about 0.0079 moles per liter.

13. An apparatus according to claim 4 wherein after immersing the
10 polyethersulfone or ion exchange resin-coated substrate in a solution of pentane and elemental iodine the polyethersulfone or ion exchange resin-coated substrate is then rinsed in pentane.

14. An apparatus according to claim 1 wherein the polyethersulfone or Anion
15 exchange resin-coated surface is a surface of a substrate wherein the substrate is selected from the group consisting of filter paper, filter tape, and a membrane.